Welcome to the second AmeriFlux Webinar Series

Measurement Best Practices panel discussion

Hosted by the AmeriFlux Tech Team
Berkeley, CA
Sept 25, 2020; 11 am (PST)

Webinar content

Introduction (6 minutes)

Topic 1: (15 minutes)
- Introduction (1 minute)
- Lead panelist (7 minutes)
- Q&A with panelists (7 minutes)

Topic 2: (15 minutes)

Topic 3: (15 minutes)

Mute.
Unmute to speak

View chat window
Send messages for questions, comments, and zoom help.

Technical issues during the webinar: AMP-webinars@lbl.gov

Introduction to the AmeriFlux Tech Team

Who:Sébastien Biraud(1), Stephen Chan(2), Housen Chu(3), Sigrid Dengel(4)

What: Maintain and enhance data quality across the AmeriFlux network

How:

- Site evaluation
- Loaner instruments
- Calibrated PAR sensors
- Year of Methane Loaners
- CO_2 & CH_4 calibration gases
- Portable Profile System
- Rapid Response System

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Do we need best practices?

Collecting continuous, high-quality flux observations is **hard work**

- Many instruments to track
- Challenging work environments
- Field work never goes as planned
- Something is always breaking
- We are forgetful
- Not enough hours in the day
- Too much data to monitor

Every site is different but we'd like to help. Today's discussion panel is a start but please visit our website for a best-practices checklist and contact us if you have questions!

https://ameriflux.lbl.gov/tech/technical-resources/

ameriflux-tech@lbl.gov

Introduction to the Panelists

Kim Novick
(Indiana University)
MMSF Core Site PI

Gil Bohrer
(The Ohio State University)
UMBS Core Site PI

Daphne Szutu
(University California, Berkeley)
Tonzi/Vaira Delta Core sites

Colin Edgar
(University of Alaska, Fairbanks)
Imnavait watershed sites and others

Inke Forbrich
(Marine Biological Laboratory)
US-PHM & US-PLM

Russ Scott
(USDA)
SECA Core Site PI

#1: Maintain data quality and minimizing gaps

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- Power supply
- Instrument down
  - Calibration / preventive maintenance
  - Sensor failure
- Early detection of issues
  - Remote access to data
  - Automated data quality test
  - More eyes on data
  - Checklists for workflow
- Complementary measurements / sensors

#1: Maintain data quality and minimizing gaps

Russ.Scott@usda.gov

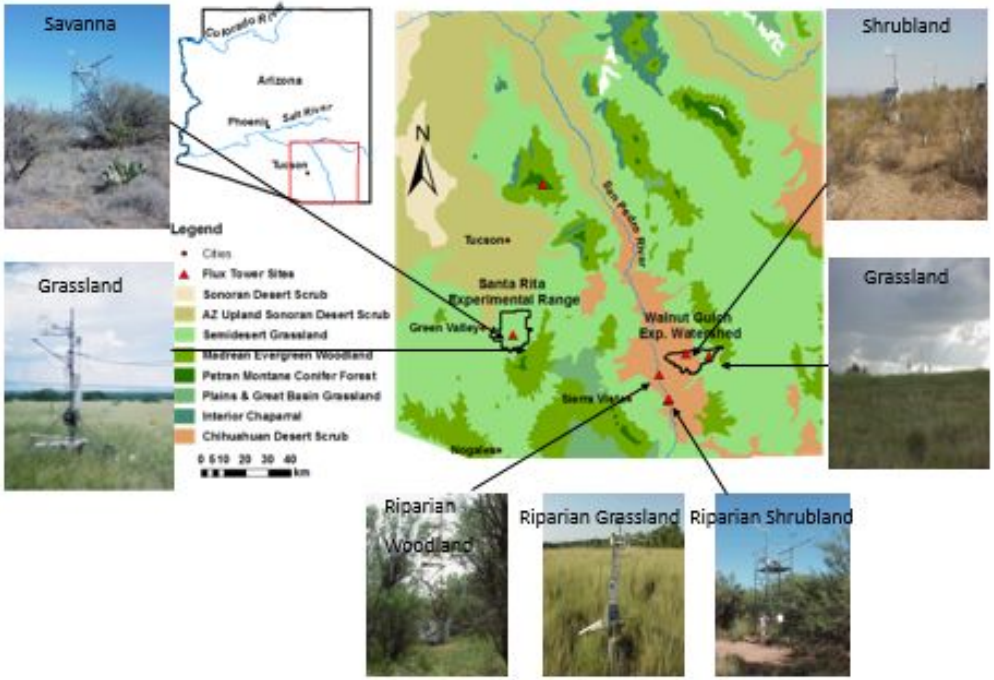
1. **Frequent** access to data
2. **Frequent** automated data checks
3. **Frequent** longer-term data looks
4. Redundancy in data storage and instrumentation
5. Personnel and succession planning

Take pride in collecting and providing the highest quality data
You can’t go back in time to correct things

#1: Maintain data quality and minimizing gaps

Frequent access to data:

- Cellular modems and data plans are generally inexpensive
- Site dataloggers automatically downloaded via commercial or homemade programs
- Ideally, data should be coming in at least daily
- If high-frequency data can't be downloaded, then process remotely and send 30 min data

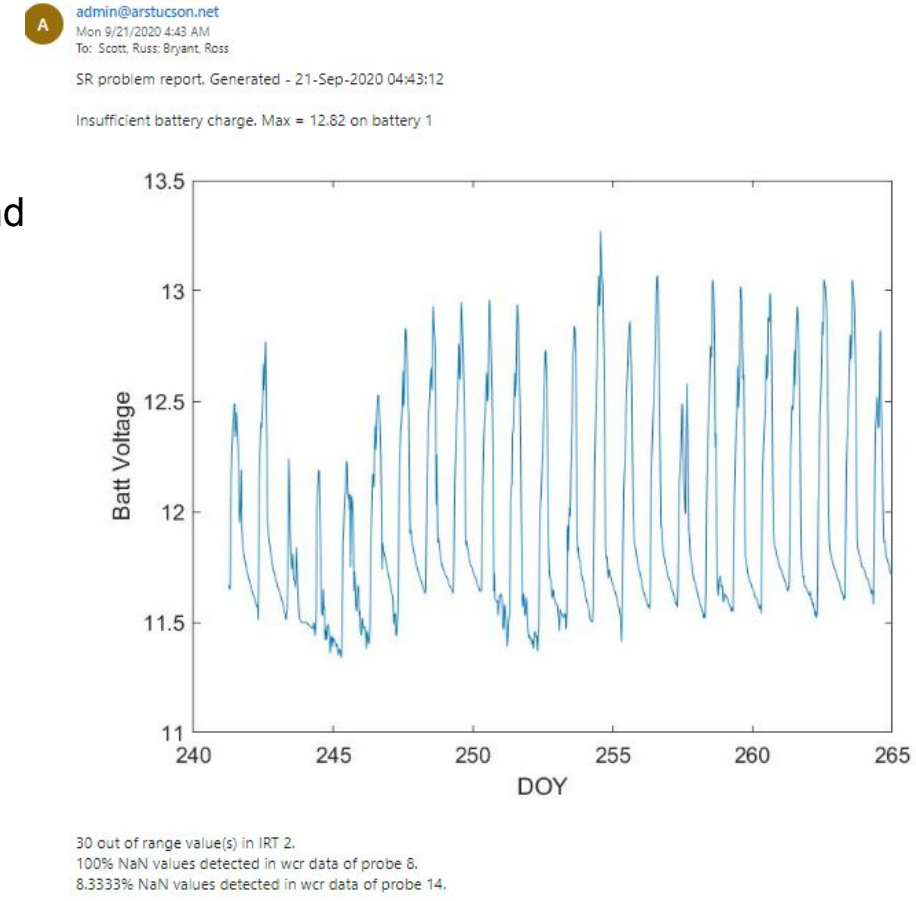


#1: Maintain data quality and minimizing gaps

Frequent automated data checks

Regular data downloads appended to yearly files and checked nightly for data irregularities

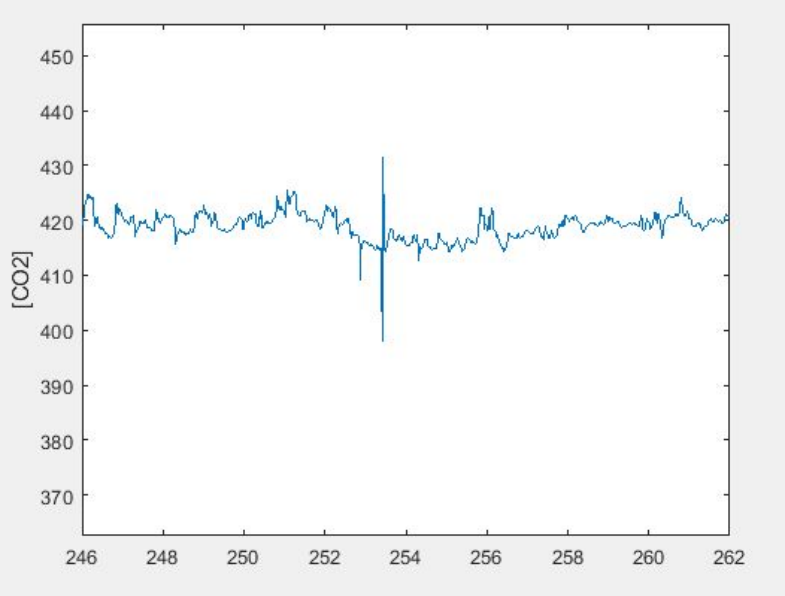
1. Met and soil data fall within reasonable ranges
2. Eddy covariance data
    a. CSAT error counts and data range
    b. IRGA gas concentration means and drifts
3. Battery/power supply
4. Email report (“more eyes on the data”)

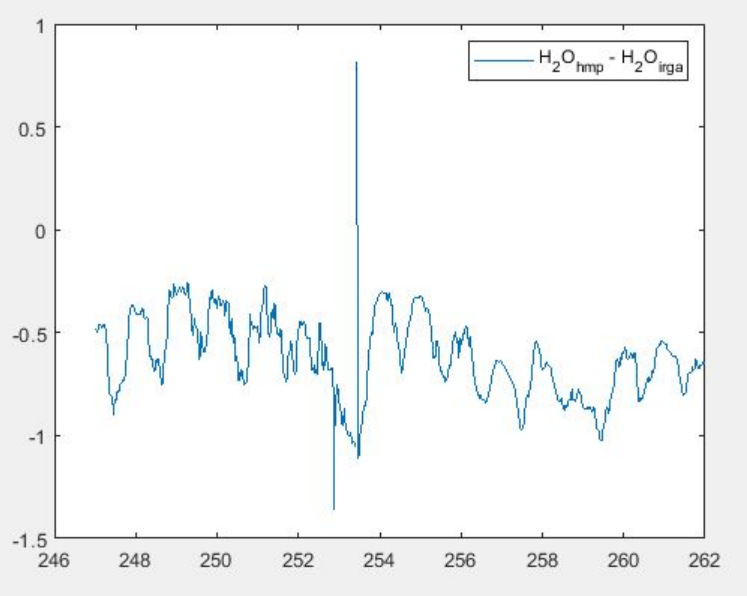


#1: Maintain data quality and minimizing gaps

Frequent longer-term data looks

Use commercial software (make sure you know what they are doing) or develop your own scripts to view your data in a regular and methodical way, e.g.,

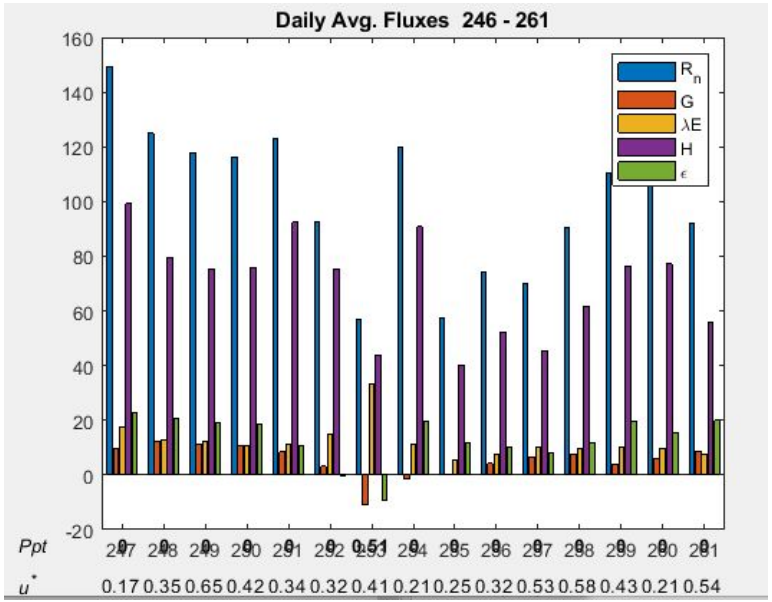


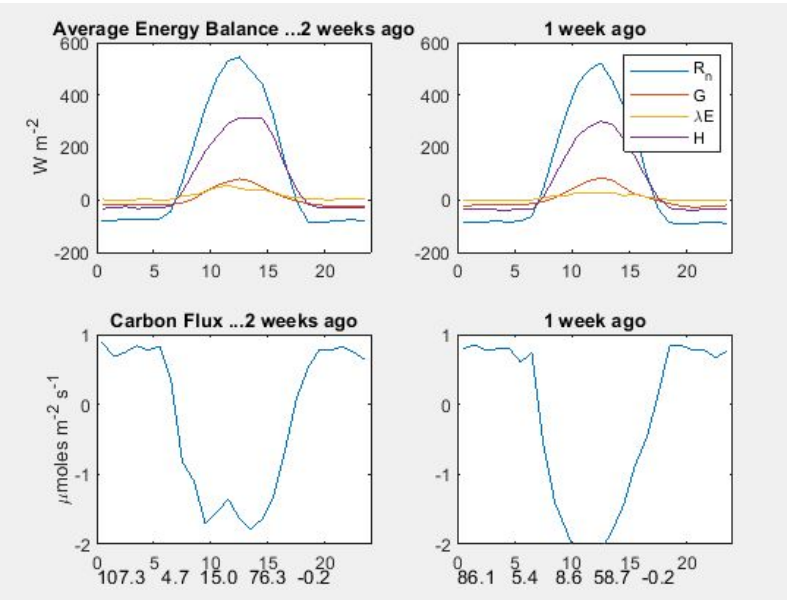


Write down things to fix or check in field book or spreadsheet!

#1: Maintain data quality and minimizing gaps

Frequent longer-term data looks, for example ...





#1: Maintain data quality and minimizing gaps

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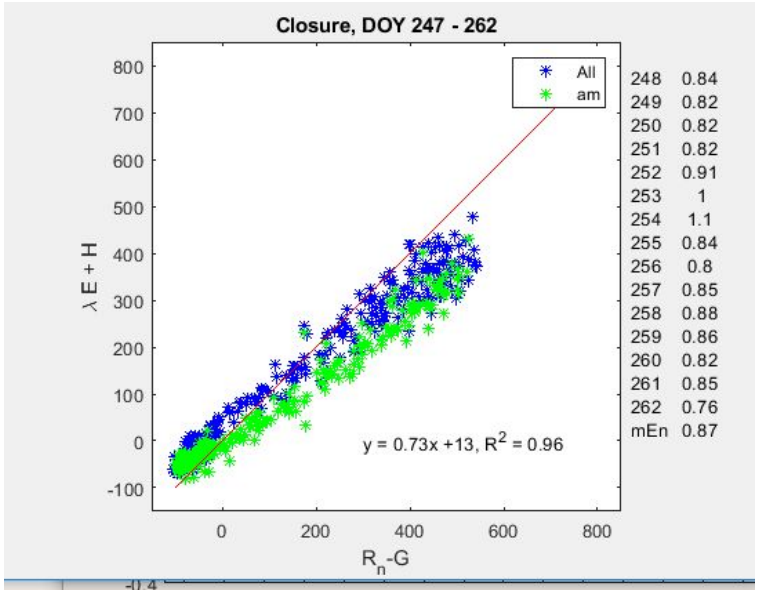

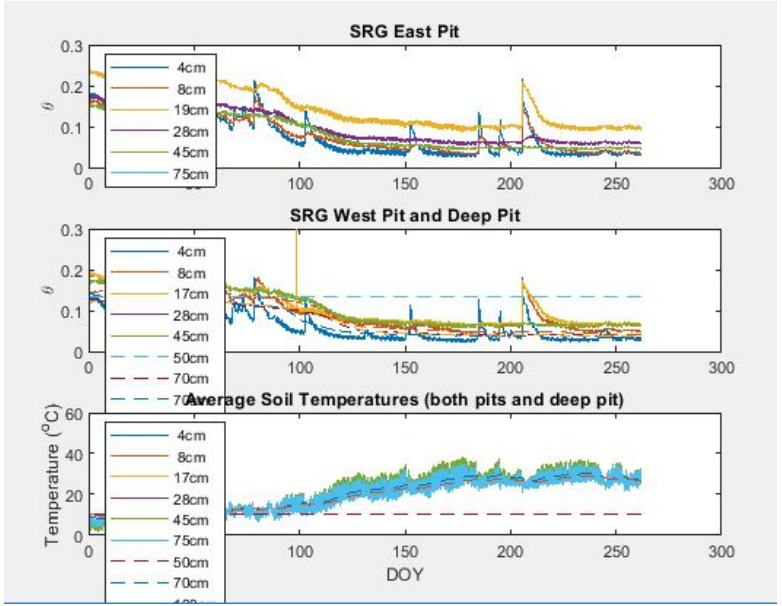

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#1: Maintain data quality and minimizing gaps

Redundancy in data storage and instrumentation

1. Data storage
    a. Stored locally and remotely
    b. Local archives backed up daily

2. Consider duplicate measurements for critical measurements (e.g., used for gap-filling)
    a. Temp/RH
    b. PAR/Srad
    c. Precipitation (try to do it correctly!)

Personnel and succession planning

1. Play cake walk, not hot potato.
    a. Determine who is responsible for what

2. Good techs and students (sadly) move on
    a. Plan ahead
    b. Who or where is the repository of information?
3. Good instruments don't last forever

Take pride in collecting and providing the highest quality data.
You can't go back in time to correct things.

#2: Field safety and field work in COVID era

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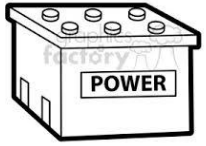
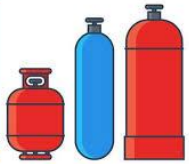
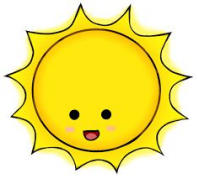
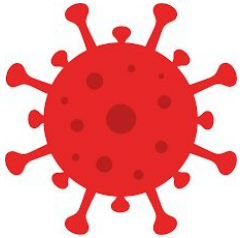




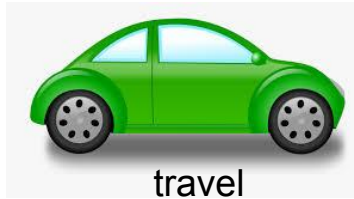
chemical, electrical, pressure



environmental

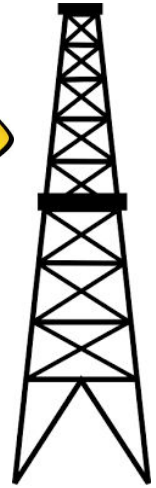


covid-19



travel

working at height



biological

human

ameriflux.lbl.gov/tech/safety

Be prepared & work in pairs

knovick@indiana.edu

Have a safety plan for your site
weather protocols, inspection protocols, use of PPE, first aid kit locations, key contact info including first responders, list of common hazards and threats and what to do when you encounter them

Make contact with first responders in advance: Reach out to the fire department to make sure they know where your tall tower is located

Training: Team members should undergo the minimum required trainings (e.g. fall protection, driver certification); For some, strive to go beyond the minimum (first aid, mountain road driving, tower rescue)

Buddy Systems
Work in pairs whenever possible.
Have a rigorous check in-checkout system for low-risk field work

Human dimensions of field work safety

Some team members are at elevated risk from human threats in the field. Adopt procedures to mitigate these risks that apply to all team members

If a team member doesn't FEEL safe, they aren't safe

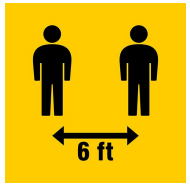
Empower EVERYONE on the team to identify safety concerns, and halt work to address them.

Reiterate, repeatedly, that safety comes first, and is far more important than getting that last little bit of data. Our instincts to get the job done can otherwise make this hard to remember

COVID-19 Best Practices for Safety/Operations

Informed by IU & NEON policies

Sustain six feet of separation...even outdoors



Keep masks on if you are working within 15' of others

Avoid vehicle sharing

Be accomodating (to team members uncomfortable working in groups or in the lab, and, to team members that are somehow supposed to now do their jobs while also caring for young children)

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#3: Ancillary dataset supporting flux observations

- Needed ancillary data to understand ecosystem

  Too many - too few, too often - too sparse, too early - too late?

- Identification of key variables at an early stage of site setup is critical
  - Measurement type, collection start and collection frequency;
  - Precision and accuracy are in the eyes of the beholder - some data rely on subjective observations;

There is more to a flux site than its tower

Gil Bohrer
(bohrer.17@osu.edu)

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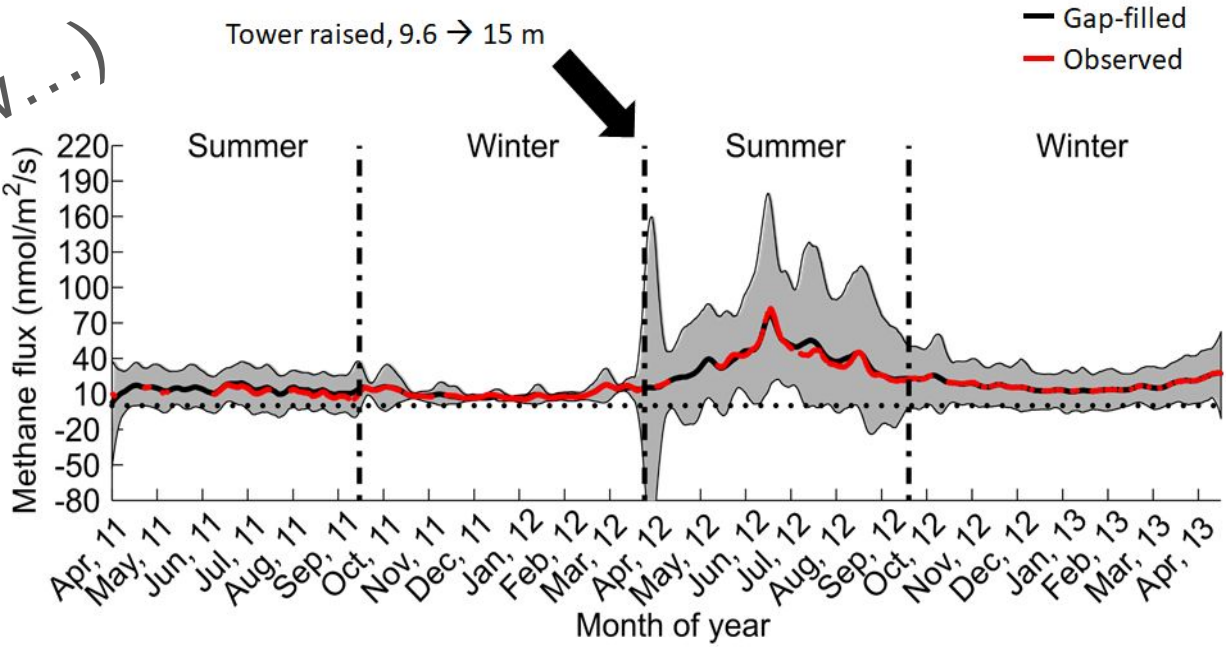
BADM - the most critical ancillary variables

Be kind to your users!
(The more they know…)



Morin et. al, Ecological Engineering (2014)
Morin et. al, Journal of Geophysical Research: Biogeosciences (2014)

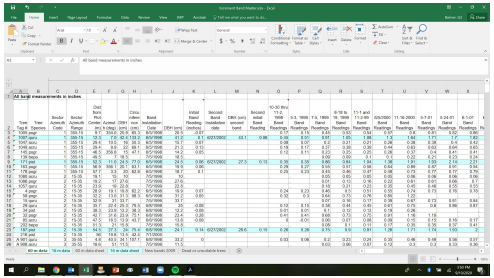
Gil Bohrer
(bohrer.17@osu.edu)

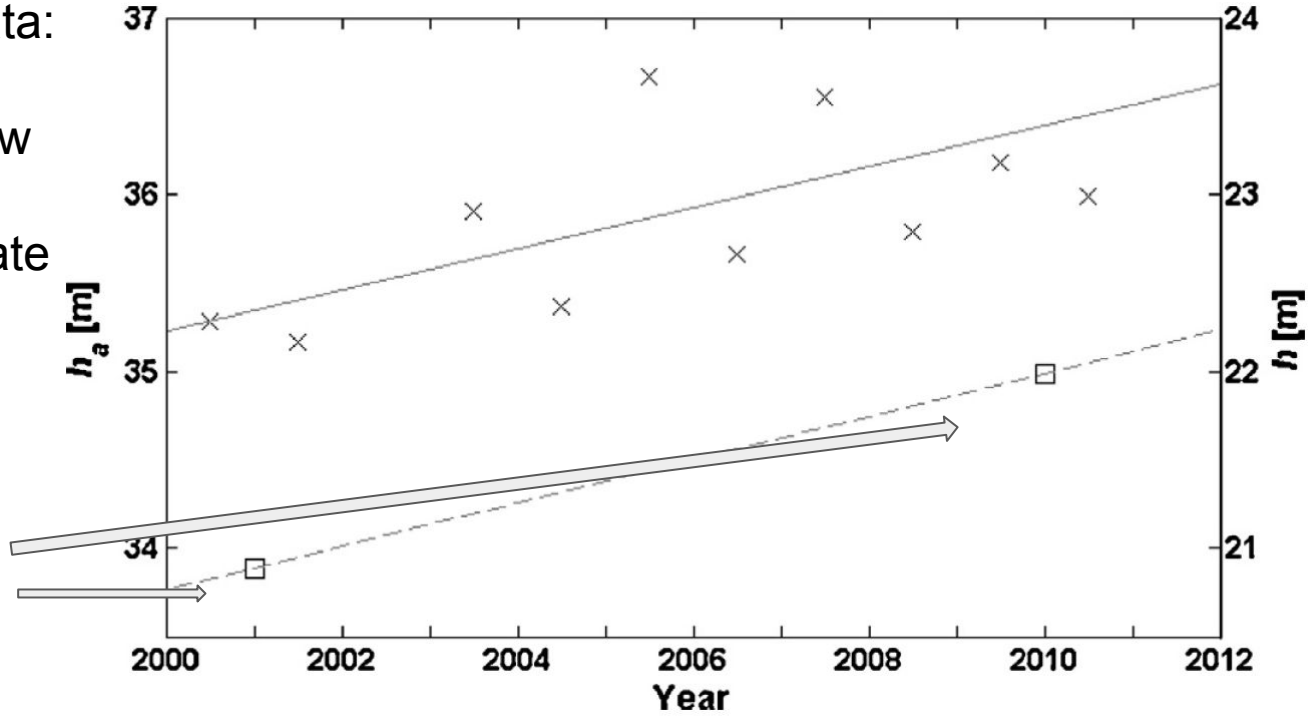
Tower-based aerodynamic height tracks forest growth

Other types of ancillary data:

Vegetation monitoring allow comparing
fluxes ← → ecological state

“Band Master”





Maurer et al., Agricultural and Forest Meteorology: 2013

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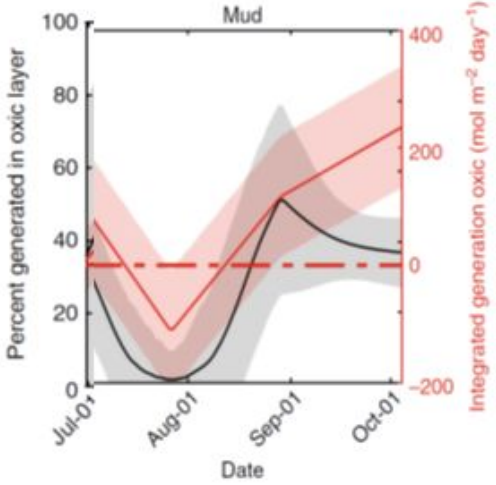
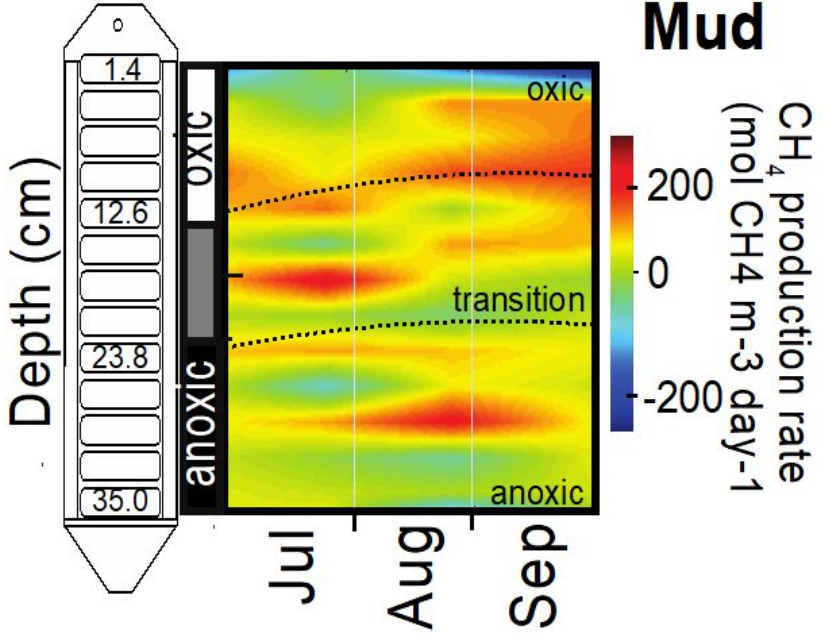
(bohrer.17@osu.edu)

First quantitative observation of the methane paradox

Combines:

- EC tower
- Chamber flux
- Porewater concentrations





Angle et al., Nature Communications: 2017

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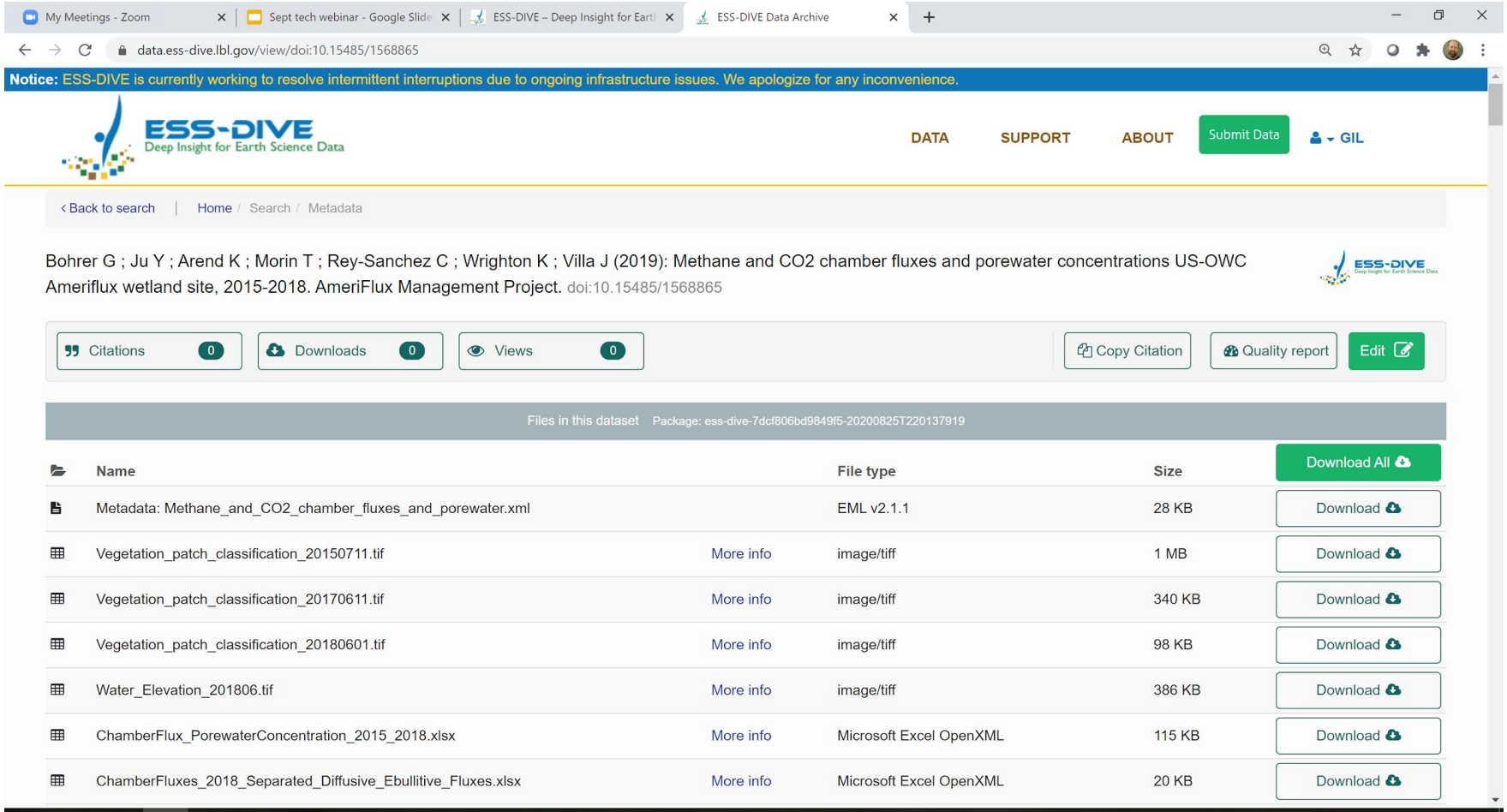
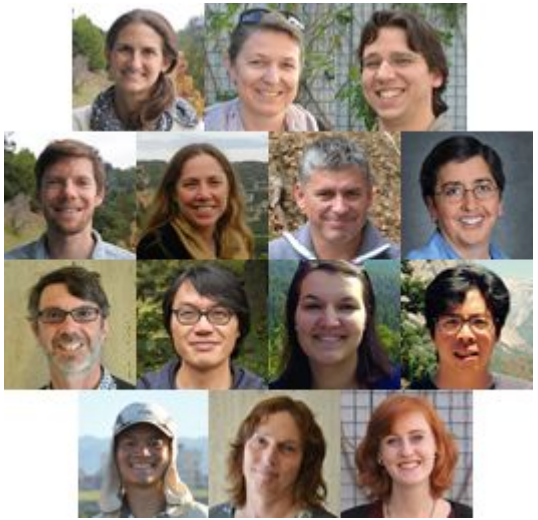
Not everything fits in BADM



Thank you for joining the panel discussion webinar



We'd love to hear from you:

- Technical support: ameriflux-tech@lbl.gov
- Data support: ameriflux-support@lbl.gov
- Get involved: ameriflux@lbl.gov